the CuPc, PTCDA, and PTCBI also performed photoconversion and exciton ionization in addition to transporting the separated carriers. Accordingly, an alternate embodiment of the present invention (not depicted) in a multilayer device would include the cathode on the bottom. The inner pair of organic materials may each be an organic dye chosen to have photosensitivity in a desired region of the spectrum. Since the Alq_3 / α-NPD pair is photosensitive in the ultraviolet (UV) part of the spectrum, multilayer device 600 with this organic pair combination is a particular exemplary embodiment of a UV photodetector. Further, the dye pair is preferably chosen to have a LUMO-HOMO gap offset as described above. In yet another embodiment (not shown) one or both of the outer pair of organic layers is replaced with a thin layer, approximately 50-150Å of Mg:Ag alloy which acts as a charge transfer, extraction, and protective cap layer[E-1]

D1 Cont'd

In the Claims:

✓ Please cancel claims 29, 30, 32-34, and 54-56 without prejudice.

REMARKS

Applicants gratefully acknowledge the Examiner's allowance of claims 31, 35 and 57-63 in the Final Office Action mailed May 10, 2001. Applicants respectfully submit that the subject patent application, in light of the present amendment and remarks, is now in condition for allowance.

In response to the Advisory Action mailed on July 23, 2001 and the Final Office Action mailed May 10, 2001, Applicants have canceled, without prejudice, claims 29, 30, 32-34, and 54-56. These claims have been rejected by the Examiner under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al. (U.S. Patent No. 5,350,459) in view of Sacrifitci et al. (U.S. Patent No. 5,331,183). Since Applicants have herein canceled claims 29, 30, 32-34, and 54-56, Applicants respectfully submit that these claim rejections have

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been rendered moot and should therefore be withdrawn.

Applicants have also herein amended the Specification to remedy a typographical error on page 31, line 6. The word "third" was changed to "fourth" and "605" was changed to "606" in order to accurately reflect an embodiment of the invention as depicted in Figure 6.

Attached hereto is a marked-up version of the changes made to the Specification and claims by the current amendment. The attached page is captioned "**Version with markings to show changes made.**"

In light of the foregoing amendment and remarks, Applicants respectfully submit that all pending claims are now in condition for allowance. Prompt reconsideration and allowance of the present application are therefore earnestly solicited.

Respectfully submitted,
KENYON & KENYON

Dated: Aug. 10, 2001

By: _____

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Specification:

The paragraph starting on page 30 at line 25 has been amended as follows:

An exemplary embodiment of a organic photosensitive optoelectronic cell with multiple organic layers, or a *multilayer* device 600, is shown in Fig. 6. Insulating or conducting substrate 601 supports the device. First electrode 602 comprises, e.g., ITO of approximate thickness 1000-4000 Å, preferably less than 2000 Å and most preferably around 1000 Å and is adjacent to first organic layer 603 comprising, e.g., PTCDA, PTCBI, or CuPc of approximate thickness 20-50 Å. A second organic layer 604 comprises, e.g., 4,4'-bis[N-(1-napthyl)-N-phenyl-amino]biphenyl (α-NPD), approximately 200-500 Å in thickness, and is adjacent to first organic layer 603. A third organic layer 605, comprising, e.g., aluminum *tris*(8-hydroxyquinoline) (Alq_3), approximately 200-500 Å in thickness, is adjacent to second organic layer 604 to form a rectifying heterojunction at the second organic layer 604 / third organic layer 605 interface. A fourth organic layer 606, comprising, e.g., CuPc, PTCBI, or PTCDA, of approximate thickness 20-50 Å is adjacent to third organic layer 605. Finally, second transparent electrode 607 is adjacent to the ~~third~~ fourth organic layer ~~605~~ 606 and comprises, e.g., ITO of approximate thickness 1000-4000 Å, preferably less than 2000 Å and most preferably around 1000 Å. In this embodiment, an extra pair of organic materials, here second organic layer 604 and third organic layer 605, selected to have appropriate relative mobilities and HOMO-LUMO offset for exciton ionization and charge separation is placed within a "sandwich" of two other organic materials, here first organic layer 602 and fourth organic layer 606. In this instance, the "inner" pair of organic materials, 604 and 605, provides the exciton ionization and charge separation and the "outer" pair, 603 and 606, serves both as charge transporting layers, i.e., transporting the separated carriers to the proper electrodes for substantially ohmic extraction, and as protective cap layers, i.e., protecting the inner pair of organic layers from damage during deposition and use. The outer pair of

organic materials may be from the group consisting of CuPc, PTCDA, and PTCBI, or any two of the three may be used. That is, the same material or any combination thereof may be used for both contacts. Note, however, in embodiment 600, the interior pair of layers, 604 and 605, are preferably deposited so that the cathode side is on top so as to incorporate a low resistance cathode. However, as with the exemplary embodiment of Fig. 4A, the order of the deposition of the inner pair of organic materials is not critical electronically, though the order of the inner pair determines the polarity of the photosensitive optoelectronic device . Since the outer pair of organic layers is relatively thin, their electronic properties are of much less significance here than in the bilayer exemplary embodiment described herein above wherein the CuPc, PTCDA, and PTCBI also performed photoconversion and exciton ionization in addition to transporting the separated carriers. Accordingly, an alternate embodiment of the present invention (not depicted) in a multilayer device would include the cathode on the bottom. The inner pair of organic materials may each be an organic dye chosen to have photosensitivity in a desired region of the spectrum. Since the Alq_3 / α-NPD pair is photosensitive in the ultraviolet (UV) part of the spectrum, multilayer device 600 with this organic pair combination is a particular exemplary embodiment of a UV photodetector. Further, the dye pair is preferably chosen to have a LUMO-HOMO gap offset as described above. In yet another embodiment (not shown) one or both of the outer pair of organic layers is replaced with a thin layer, approximately 50-150Å of Mg:Ag alloy which acts as a charge transfer, extraction, and protective cap layer.

In the Claims:

Claims 29, 30, 32-34, and 54-56 have been cancelled without prejudice.